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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/731,105	12/10/2003	Tsuyoshi Kaneko	117831	4534
25944	7590	08/09/2005	EXAMINER	
OLIFF & BERRIDGE, PLC P.O. BOX 19928 ALEXANDRIA, VA 22320			SONG, SARAH U	
			ART UNIT	PAPER NUMBER
			2874	

DATE MAILED: 08/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/731,105

Applicant(s)

KANEKO, TSUYOSHI

Examiner

Sarah Song

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6,9-11 and 13-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6,9-11 and 13-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. Applicant's communication filed on 23 May 2005 has been carefully considered and placed of record in the file. Claims 1, 3, 18 and 20 have been amended. Claims 7, 8 and 12 are canceled. Claims 25-30 are newly added. Claims 1-6, 9-11 and 13-30 are pending.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 1-6, 9-11, 13-22 and 24-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eguchi et al. (JP 09-197196 previously relied upon) in view of Ebeling et al. (U.S. Patent 6,773,169 previously cited).**

4. Regarding claims 1-4, Eguchi et al. discloses a connection structure comprising an optical element 2 including an optical surface; an optical fiber 1 including a core and a clad (see Figure 7); and a connecting part 3 that joins an end surface of the core and the optical surface. At least a part of the end surface of the optical fiber and the core faces the optical surface. See Figure 1.

5. Eguchi et al. does not disclose an end surface of the fiber having a convex part, or the end surface of the core protruding from the end surface of the clad, and the core and the clad forming a portion defining a convex an the end part of the optical fiber.

6. Ebeling et al. discloses a similar connection structure further comprising an end surface of the fiber having a convex part, or the end surface of the core protruding from the end surface of the clad, and the core and the clad forming a portion defining a convex an the end part of the

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optical fiber. See Figure 7. It is additionally noted that fibers having a convex end part (i.e. lensed fibers) are well known in the art for improving coupling efficiency.

7. Eguchi et al. and Ebeling et al. are analogous art as pertaining to transparent connection structures.

8. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the fiber of Eguchi et al. to comprise the convex part of Ebeling et al. in order to improve coupling efficiency for optimal communications.

9. Regarding claims 5 and 6, Eguchi et al. does not expressly disclose a refractive index of the connecting part to be almost equal to the refractive index of the core, or to be greater than a refractive index of the clad. However, it is well known in the art to provide a connecting part having a refractive index that is almost equal to the refractive index of the core (i.e. index-matched resins). Furthermore, since the refractive index of the core is greater than that of the clad for low-loss propagation of light, it follows that the refractive index of the connecting part would thus have a refractive index that is greater than a refractive index of the clad. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the connecting part 3 having a refractive index almost equal to that of the core and greater than that of the clad in order to reduce coupling losses at the interface between the core and the connecting part.

10. Regarding claim 9-11, Eguchi et al. discloses an area that surrounds the connecting part to be covered by a sealant 7 at an end part, the refractive index of the sealant being smaller than the refractive index of the core (i.e. the optical waveguide; see last two sentences of Paragraph [0012]) and consequently the connecting part as well. As noted above, it would have been

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obvious to one having ordinary skill in the art at the time the invention was made to provide the connecting part 3 having a refractive index almost equal to that of the core in order to reduce coupling losses. Furthermore, Eguchi et al. does not expressly disclose the refractive index of the sealant to be almost equal to the refractive index of the clad. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the sealant having similar characteristics (e.g. refractive index) as the clad, since Eguchi et al. discloses the sealant to be equivalent to a clad and in order to maintain the same optical characteristics as the optical fiber itself.

11. Regarding claims 13 and 14, the connecting part 3 is formed by hardening a liquid material that is hardened by charging energy, wherein the connecting part is composed of ultraviolet curing resin. See Abstract.

12. Regarding claim 15, the optical element is a photodiode (i.e. light receiving element, see Abstract).

13. Regarding claims 16 and 17, Eguchi et al. does not expressly disclose a semiconductor chip electrically coupled to the optical element 2. However, it is known in the art that optoelectronic light receiving or emitting elements as that disclosed by Eguchi et al. require a semiconductor chip electrically coupled thereto in order to function properly. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a semiconductor chip electrically coupled to the optical element of Eguchi et al. in order to provide requisite drive signals to the device.

14. Further regarding claim 17, Eguchi et al. does not expressly disclose the optical fiber coupled to a light-emitting element on one end and a light-receiving element on the other.

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However, it is well known in the art for optical transmission fiber to comprise an emitter on one end and a receiver on the other end. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the emitter and receiver as claimed as requisite features of a complete optical transmission line.

15. Regarding claims 18-21, Eguchi et al. also discloses a connection method comprising (a) forming a connecting part precursor 3 by applying a liquid agent to at least one of an end surface of the optical fiber (or the core of the optical fiber) and an optical surface of the optical element; and (b) forming a connecting part by hardening the connecting part precursor while joining the end surface of the optical fiber (or the core of the optical fiber) and the optical surface via the connecting part precursor. Step (b) further comprises joining the end surface of the optical fiber (or the core of the optical fiber) and the optical surface via the connecting part precursor while making at least a part of the optical fiber face the optical surface. See Abstract and Figure 1.

16. Eguchi et al. does not disclose an end surface of the fiber having a convex part.

17. Ebeling et al. discloses a similar connection structure further comprising an end surface of the fiber having a convex part. See Figure 7. It is additionally noted that fibers having a convex end part (i.e. lensed fibers) are well known in the art for improving coupling efficiency.

18. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the fiber of Eguchi et al. to comprise the convex part of Ebeling et al. in order to improve coupling efficiency for optimal communications.

19. Regarding claim 22, Figure 7 discloses the height of the end surface of the core being different from a height of an end surface of the clad.

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20. Regarding claim 24, the connecting part precursor is hardened by charging energy. See Abstract.

21. Regarding claims 25 and 26, Eguchi et al. does not expressly disclose the optical element having a column section, and the optical surface being placed on the top surface of the column section. Ebeling et al. discloses a column section 33, and the optical surface being placed on the top surface of the column section. It would have been obvious to one having ordinary skill in the art at the time the invention was made to additionally provide the column section and the optical surface being placed on the top surface of the column section in order to improve durability by providing a protective covering to the light-emitting facet of the optical element.

22. Regarding claims 27-30, both Eguchi et al. and Ebeling et al. disclose that the connection structures secures optical transmission between the components without precise alignment of the components (Paragraph [0010] and abstract, respectively). That is, the disclosed connection structures of the prior art enable alignment between respective components without the necessity of high-precision pre-alignment structures or measurements, thereby simplifying the alignment procedure and thus reducing manufacturing costs.

23. **Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eguchi et al. in view of Ebeling et al. as applied to claim 18 above, and further in view of Hayes et al. (U.S. Patent 5,707,684 cited by Applicant).**

24. Regarding claim 23, Eguchi et al. discloses the method comprising dropping the liquid agent, but does not expressly disclose an ink-jet method.

25. Hayes et al. discloses that ink-jet methods for applying microscopic droplets are well known in the art.

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26. Eguchi et al. and Hayes et al. are analogous art as pertaining to micro-optical components.

27. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of dropping the liquid agent to comprise an ink-jet method in order to improve the precision of the manufacturing method as taught by Hayes et al. See column 2, lines 8-34.

Response to Arguments

28. Applicant's arguments with respect to claims 1-30 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sarah Song whose telephone number is 571-272-2359. The examiner can normally be reached on M-Th 7:30am - 6:00pm.

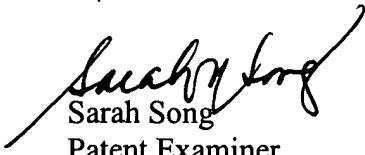
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on 571-272-2344. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Sarah Song
Patent Examiner
Group Art Unit 2874